

## MCQs on Gradient

1. The gradient of a scalar function represents:

- (a) A scalar
- (b) A vector
- (c) A matrix
- (d) A tensor

Answer: (b) A vector

2. The gradient of a function points in the direction of:

- (a) Maximum decrease
- (b) Maximum increase
- (c) Minimum value
- (d) Constant value

Answer: (b) Maximum increase

3. If the gradient of a function is zero at a point, that point is:

- (a) A maximum
- (b) A minimum
- (c) A critical point
- (d) A saddle point

Answer: (c) A critical point

4. The gradient of  $f(x, y)$  is perpendicular to:

- (a) x-axis
- (b) y-axis
- (c) Level curves
- (d) Function itself

Answer: (c) Level curves

5. The gradient of a function in Cartesian coordinates is given by:

- (a) Partial derivatives in  $x, y, z$
- (b) Second derivatives
- (c) Integral of function
- (d) None of the above

Answer: (a) Partial derivatives in  $x, y, z$

6. Which of the following represents a conservative field?

- (a) Gradient of a scalar function

- (b) Curl of a vector field
- (c) Divergence of a tensor
- (d) Laplacian of a function

Answer: (a) Gradient of a scalar function

7. The gradient operator is also known as:

- (a) Divergence
- (b) Curl
- (c) Laplacian
- (d) Del operator

Answer: (d) Del operator

8. In which direction does the gradient of a function vanish?

- (a) Along the level curves
- (b) Along the x-axis
- (c) Along the y-axis
- (d) Along the normal to the surface

Answer: (a) Along the level curves

9. If  $f(x, y) = x^2 + y^2$ , the gradient at (1,1) is:

- (a) (2,2)
- (b) (1,1)
- (c) (2,0)
- (d) (0,2)

Answer: (a) (2,2)

10. The directional derivative is computed using:

- (a) Cross product
- (b) Dot product
- (c) Curl
- (d) Integral

Answer: (b) Dot product